

INSIGHT

A/E TRANSFORMATION



This paper explores the significance of the Authorization for Expenditure process in O&G Companies and how its transformation is integral to improving financial discipline in the industry

Authorization for Expenditure

The Authorization for Expenditure (AFE) business process is the main way in which energy companies create and approve project funding proposals and allocate capital from the board approved budget. The AFE requires input from geologists, surveyors, engineers, accountants, lawyers, business analysts, economists, and upper management. The final AFE document can have upwards of 10,000 line items, take months to prepare, and take even longer to approve.

The prevailing AFE business process can be arduous and inaccurate, but will dictate the investment of billions of dollars for Oil & Gas companies. Unfortunately, for most industry players, the current AFE Process is inefficient and ineffective at controlling costs. In some cases, depending upon the maturity of the field development, the acceptable industry standard for AFE accuracy is +/- 20%. The industry as a whole is allowing far too wide an acceptable range for AFE estimates, and worse, isn't able to progressively learn from previous missed estimates. Missed earnings based on poor cost

estimates have been an industry problem for years. This is highlighted over and over again by each individual AFE that misses its mark. Even more alarming, most energy companies don't take into account historical lessons learned on AFE "misses" when producing the next AFE. This type of behavior perpetuates the lack of financial discipline and continues to push away investment from financial markets.

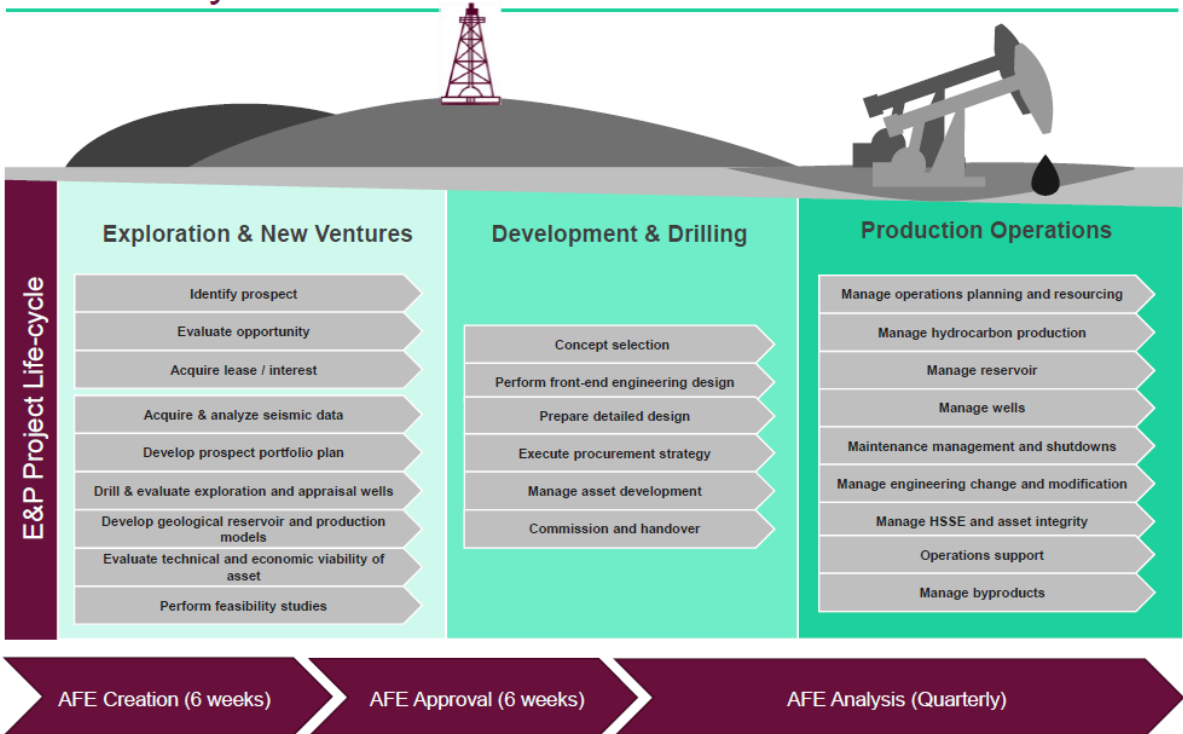
In 2018, Pioneer Natural Resources spent \$549 million more than it received in operating cash flow despite oil hitting \$65¹. In May 2019 [?], Pioneer announced it was cutting a quarter of its workforce due to hundreds of millions of dollars in cost overruns. While PNR had operational problems trying to reach production targets, much of the poor performance has been directly attributed to cost overruns and poor capital management.

Pioneer isn't alone on this front. Over the past decade, 40 of the largest independent oil and gas producers collectively spent roughly \$200 billion more than they took in from operations¹.

"I just don't think the discipline was there on the capital side,"

**-Scott Sheffield, CEO
Pioneer Natural Resources**

Industry AFE Process Overview – Drill a Well



1. Elliott, Rebecca, and Olson, Bradley. "A Leader of America's Fracking Boom Has Second Thoughts." The Wall Street Journal, Dow Jones & Company, 24 June 2019, www.wsj.com/articles/a-leader-of-americas-fracking-boom-has-second-thoughts-11561388670.

Assume that you're attempting to predict the cost of a new well. Let's say that through your current AFE process, you come up with a \$10 million dollar well estimate; that gives you a range of \$8-\$12 million based on +/- 20%. Now, extrapolate that figure across 120 AFEs (your company's well drilling program for 2019). That seemingly insignificant \$4 million acceptable variance for one new well is now a \$480 million "acceptable range" (between \$960 million - \$1.44 billion) for your entire drilling program for the year.

Imagine you could reduce that estimate differential to a Best-in-Class +/-5% variance? By taking a conscious, calculated program to transform your AFE Process. Assuming the same scale of program (120 AFEs) and an average well cost of \$10 million, a +/-5% acceptance rate will reduce your drilling program estimate range from \$480 million to \$60 million.

Typical As-Is AFE Cycle

AFE Improvement Schedule	
Number of AFEs	Accuracy
Between 1 and 20	+/-50%
Between 20 and 100	+/-20%
Over 100	+/-5%

As a company continues to develop and operate in a given formation, its AFEs will organically improve over time through trial and error. Unfortunately, it can take years to achieve decent accuracy in a certain field. The value of AFE Transformation lies in the rate at which a company can achieve +/-5% cost estimate accuracy. The diagram on the page above shows the Current AFE Process in conjunction with the total E&P Project Lifecycle as a whole. The AFE Process is only a small portion of a multi-year E&P Project, but it carries tremendous weight in determining the overall E&P strategy of the company.

Prior to the AFE Process beginning, the organization has already identified and evaluated the potential drilling opportunity and acquired the lease/interest. From this point, the E&P Group will assign a diverse team: geologists, production engineers, drilling engineers, etc. to create the AFE. Based on the seismic and geological data identified in the Exploration and New Ventures portion of the E&P Project-Lifecycle, the engineers will each fill out *thousands* of line items on a spreadsheet in order to generate their AFE estimates. Once completed, the first draft of the AFE will go to the accounting group. Accounting will then

manually review each line item and match it with the appropriate General Ledger (GL) code. The AFE will then be passed to a manager who will approve or disapprove the drilling of the proposed well. Depending on the estimated cost of the AFE, additional approval from a higher ranking corporate official may be necessary. For a domestic, land-based AFE, the Creation and Approval process can take up to 16 weeks. The AFE approval stage can take much longer depending on the quality and accuracy of the AFE.

After an AFE is approved, the company will begin taking steps to drill the well. Assuming that the well is drilled, completed, and goes into production, the AFE Analysis process will begin. AFE analysis takes place roughly quarterly, but is continuous throughout the life cycle of the well. As the well continues to operate, amendments are made for additional construction or maintenance costs using supplemental AFEs which are added to the overall AFE for the entire well. Over time, these supplements will accrue and hopefully provide new insight regarding the nuances of the well development costs in a given field, including: design improvements, production problems, undetected costs, non-productive time, etc. Once this well is ready to be plugged and abandoned, the AFE process is complete and the project is closed.

The steps depicted above seem simple enough in theory, but the process can be quite complex in practice. In addition to the inaccuracy of project estimates, AFEs are plagued by lack of a common methodology, siloed information, and protracted preparation and approval times.

Lack of Common Methodology

The most pressing issue with how AFEs are currently calculated is the lack of a common methodology. The first problem is the lack of consistency between AFE calculations among engineers. Even with the same formation, AFE estimates can vary immensely from engineer to engineer. One engineer's model could be very accurate for the region while another's could be relatively far off. As a manager, how can you accurately determine which AFE to approve or disapprove when there's the potential of a 40% variance due to completely different calculation methodologies?

The second major issue caused by lack of a common AFE methodology is the inability to match engineering estimated line items to GL codes across various AFEs. From a single AFE

standpoint, this doesn't create too big of an issue. There are a number of individual line items of an AFE which have the ability to be placed into various accounting GL code categories.

The problem occurs when comparing AFEs developed by different engineers. Let's assume that two different accounting teams receive the same AFE. The overall valuation shouldn't change too much based on the analysis provided. The timing of expenses and capital project planning, however, could be greatly affected. If one accounting group classifies a set of similar line items as CAPEX and the other classifies the same group of line items as an OPEX, the expenses incurred over various periods of time during the asset's lifecycle will vary. Variance in anticipated funding needs and cash flow estimates per quarter could put financial strain on certain projects.

Finally, the lack of a shared AFE calculation methodology can lead to poor future financial planning & analysis, and severe forensic accounting problems.

Mismatched POs, field tickets, and invoices are widespread on Oil & Gas projects. Without an integrated AFE Process which can translate engineering estimates to the GL coding system, it can be impossible to track the thousands of line items and purchases, and changes thereto, associated with each AFE over the lifetime of a project. This lack of integrated precision between user-groups makes it exceedingly difficult to learn where cost overruns occurred on previous AFEs and how your organization can utilize that information to improve the planning process for future projects' AFE's.

As a company operates in a given field over time, it picks up on subtle differences in lithology, liquids/gas ratio, production rates, etc. from its initial estimates. Over time, the company should take all of its historical information, compare it to its initial AFEs and use it to **improve its current and future AFEs**.

Reversion to the mean will occur naturally over this time, but without a standardized process in place to institutionalize, manage, and collectively learn from and develop the AFE process, tremendous knowledge and value is being left on the table, leading to unreliable AFEs and overall FP&A projections.

Siloed Information

Siloed information and lack of a shared calculation methodology go hand-in-hand. For example, after high level overview, the Business Unit manager realizes that a well is projected to go \$1.5 million over budget. The manager attempts to contact the engineer responsible for the AFE. Unfortunately the engineer left a year ago, along with his master AFE spreadsheet. Not only is the group unable to explain going \$1.5 million over budget, but the current group members no longer have the ability to examine the original AFE in order to determine the cause(s) of the overestimated project and improve upon it for future AFEs. The information was siloed with one engineer from the rest of the organization. With a central repository in place, the issue would have been mitigated.

As previously mentioned, E&P groups build familiarity with a field over time. If the team is able to quickly and effectively analyze its past AFEs with new-found production information, it will be able to calculate more accurate and profitable models for future wells.

Finally, **should your organization be audited** for any reason, being able to reasonably justify your accounting methods based on expert engineering analyses will go a long way with your auditors, even if the estimates are off.

Protracted Preparation & Approval

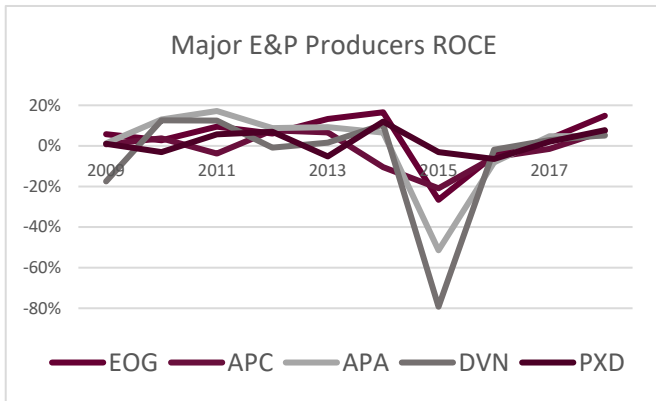
The combination of different AFE calculation methodologies, paired with siloed AFE data, is what creates the final major issue of the as-is AFE Process - Protracted Preparation & Approval.

As previously mentioned, when historical AFE information is aggregated and analyzed for a particular field over time, the AFE estimates should improve with each iteration. The AFE should get to the point where only minor changes should be made from the previous AFE of a similar nearby well. This in turn would reduce the preparation time of the AFE immensely.

Toward this end, GL code standardization between engineering/accounting teams would help expedite the approval process from the manager's perspective by making it easier to compare costs between AFEs across the company's entire drilling program.

Industry-wide Problem

The as-is AFE Process is not a unique issue affecting a handful of companies, it's an industry-wide problem. Outside of a handful of industry leaders, most competitors are much closer to +/- 20% than to +/- 5% accuracy for their AFE estimates in well-developed fields. The chart below compares ROCEs of some leading E&P companies.



The average annual ROCE of these companies over a 10-year span is just under 0; compared to other industries it's horrible. One way to improve ROCE performance going forward is by transforming your company's AFE process. An improved AFE process will lead to more accurate cost estimates and informed decision making. Margins will continue to diminish as the "lower for longer" price environment in O&G persists. Prudent capital management will be at the forefront in driving bottom-line performance as companies continue to drive down the price of oil recovery. The companies which find the most effective way to transform their business for this environment will be the "winners" over the next decade. O&G Companies' strategies are predictable; when oil prices are up, strategies center around growth and acquisitions – when oil prices are down, they are based on cost cutting and divestiture. The current market climate prescribes a combination of both strategies. Occidental just won the bidding war for Anadarko's assets and there's a deluge of rumors of other potential acquisitions in the E&P space as O&G Companies battle for Permian supremacy.

O&G corporate strategies can be reactionary and are rarely driven by competition, but that's beginning to change as they prepare for a sprint in cost reductions to reach \$15/bbl produced oil. Staale Gjervik, president of XTO Energy, stated Exxon's ambitious goal at CERAWEEK 2019². While there is some natural healthy skepticism as to the feasibility of his claim (by 2023 no less), the lines have been drawn and the game

is on. Oil company's E&P strategies are not only being dictated by market forces; they are being driven by open competition. This competition will force companies to re-think their cost management strategies and improve their current operations.

AFE Transformation Process

AFE Improvement Schedule	
Number of AFEs	Accuracy
Between 1 and 2	+/-50%
Between 2 and 10	+/-20%
Over 10	+/-5%

The goal of AFE Transformation is to improve financial performance for O&G companies. After tackling AFE Transformation, your company should be able to achieve best in class, quickly narrowing from +/-20% to +/- 5%. After 10 AFEs, a company's drilling program should turn into a highly efficient, manufacturing process - not exclusive singular drilling projects. The first step towards manufacturing excellence in a new play is AFE standardization.

AFE Standardization

Developing an overarching standard AFE form design and approval process is the most important component of AFE Transformation.

Standardizing the form allows for ease of comparison between and among proposed projects throughout the organization. AFEs that are constructed from a common framework will lead to improved project cost prediction and analysis as well as capital allocation.

This initial, crucial step takes a great deal of legwork. Standardizing AFE calculations should include user interviews, workshops with business segments, detailed process analyses, process mapping, and process redesigns. Once all inputs of the AFE form have been explored, the design document can be created. This document should be all-encompassing; tying each engineering line item to a corresponding GL code. Matched GL codes with engineering inputs greatly reduces the number of iterations required to come to an agreed-upon project estimate, therefore reducing the time it takes for approval or declination. On the back-side of the project, this makes single project and multi-project look-back analyses infinitely easier and more productive. AFE Transformation will improve the forensic accounting analysis by creating a fully transparent review process based on a comprehensively mapped and matched engineering/ accounting framework.

2. Crowley, Kevin. "Exxon Aims for \$15-a-Barrel Costs in Giant Permian Operation." Bloomberg.com, Bloomberg, 14 Mar. 2019, www.bloomberg.com/news/articles/2019-03-14/exxon-aims-for-15-a-barrel-costs-in-giant-permian-operation.

Cost overruns and poorly estimated project expenses will be easily identified and will help improve the quality of future AFEs in a given play.

Interconnectivity

One of the other major problems with the As-Is AFE process is the lack of interconnectivity among business segments. Each group has siloed data inputs which must be aggregated in order to calculate a precise AFE. AFE standardization is the driving force of AFE Transformation, but interconnectivity is what allows the standardized AFE process to succeed. Linked AFE inputs from across the organization leads to improved (a) accuracy, (b) development time, (c) project management, and, (d) transparency.

A key component of data interconnectivity is not only project funding allocation on a company-wide basis, but cost allocation on each individual project as well. When an E&P company enters a new play on an exploratory basis, costs are incurred, but aren't necessarily allocated to any individual project because the project doesn't exist yet. However, when the project is created, the As-Is AFE process rarely allocates exploratory costs and fees to the respective future AFEs.

At times these figures can be significant. If they aren't accounted for in the initial AFE, management may choose to greenlight a well which is doomed to go over budget before a single physical operation at the well site takes place. AFE Transformation establishes an intelligent data interconnectivity structure linking engineering line items to GL Codes to the organization's ERP software ensuring seamless connectivity and transparency. After AFE Transformation, aggregated exploration costs can be allocated to approved drilling projects based on the company's proposed drilling strategy for the new area, thereby creating more accurate future AFE documents.

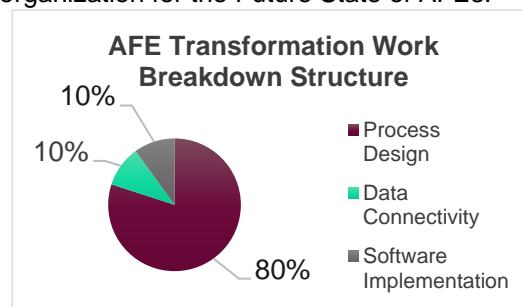
AFE Transformation WBS

The largest component of any AFE Transformation is the process design. As it currently stands, AFE processes are broken across the industry. Whether this is due to poor data integration, system mapping, poor quality assurance between user groups, etc., a well-executed business process redesign will fix the broken mechanisms at the heart of your AFE operations. A foundation of business process excellence will pave the way for integrating

related advanced technologies such as RPA and other software implementations which will allow you to easily scale operational excellence throughout your organization.

Future State of AFEs

While the focus of AFE Transformation is to fix all of the issues detailed above, it's vital that your AFE Transformation also prepares your organization for the Future State of AFEs.



The way you manage, evaluate, and improve your business is constantly changing. Your new AFE Process should incorporate a structure in which it can organically evolve along with the organization, without complete procedural overhauls. RPA will help facilitate any future changes your organization may make to your AFE procedures because it works seamlessly with existing enterprise software and architecture.

Once you have accumulated a number of AFEs, their corresponding well log data, and production results, you can analyze all pertinent data using business analytics to further increase AFE accuracy results, automate AFE creation and approvals, enhance your seismic analysis capabilities for future discoveries, and increase production rates throughout your organization.

Sia Partners & Your AFE Transformation

Sia Partners has a dedicated Houston based Oil & Gas Advisory team with decades of industry experience. As one of our core offerings, Sia Partners' Houston Energy & Advisory team is trained and experienced in AFE Transformation, and supported by over 70 data scientists. Sia Partners helps organizations overcome the hurdles associated with implementing exceptional financial discipline through a sophisticated AFE examination and implementation process. We provide expert support and advice on each hurdle of AFE Transformation through our domain and functional experiences with project management, finance, accounting, and change management.

YOUR CONTACTS

GREGORIO PACHECO

Consultant
+ 1 201 452 7316
Gregorio.pacheco@sia-partners.com

SEAN JUMP

Senior Manager
+ 1 832 347 2411
Sean.jump@sia-partners.com

ABOUT SIA PARTNERS

Founded in 1999, Sia Partners is an independent global management consulting firm and pioneer of Consulting 4.0 with over 1400 consultants and an annual turnover of USD 280 million. The Group has 23 offices in 16 countries. Through unparalleled industry expertise, Sia Partners delivers superior value and tangible results for its clients. Sia Partners is a global partnership wholly owned by its executives.



Sia Partners is a next generation consulting firm focused on delivering superior value and tangible results to its clients as they navigate the digital revolution. Our global footprint and our expertise in more than 30 sectors and services allow us to enhance our clients' businesses worldwide. We guide their projects and initiatives in strategy, business transformation, IT & digital strategy, and Data Science. As the pioneer of Consulting 4.0, we develop consulting bots and integrate AI in our solutions.

Follow us on **LinkedIn** and **Twitter @SiaPartners**
For more information, visit:

www.sia-partners.com

- Abu Dhabi
- Amsterdam
- Brussels
- Casablanca
- Charlotte
- Denver
- Doha
- Dubai
- Frankfurt
- Hamburg
- Hong Kong
- Houston
- London
- Luxembourg
- Lyon
- Milan
- Montreal
- New York
- Paris
- Riyadh
- Rome
- Seattle
- Singapore
- Tokyo

